State of Oregon
Department of Environmental Quality **Memorandum**

Date: December 19, 2019

To: Chris Budai, U.S. Army Corps of Engineers

From: Jennifer Peterson, Mike Poulsen, Bob Schwarz - DEQ

Subject: Bradford Island, ECSI # 2010; Review of draft *Quality Assurance Project Plan for Passive Sampling at River Operable Unit*

We have reviewed the draft *Quality Assurance Project Plan for Passive Sampling at River Operable Unit* (QAPP). This document was prepared by the U.S. Army Corps of Engineers and is dated December 2, 2019. Our comments are provided below.

General Comment. The development of DQOs and decision criteria should also be stated in the main text in the work plan.

Specific Comments

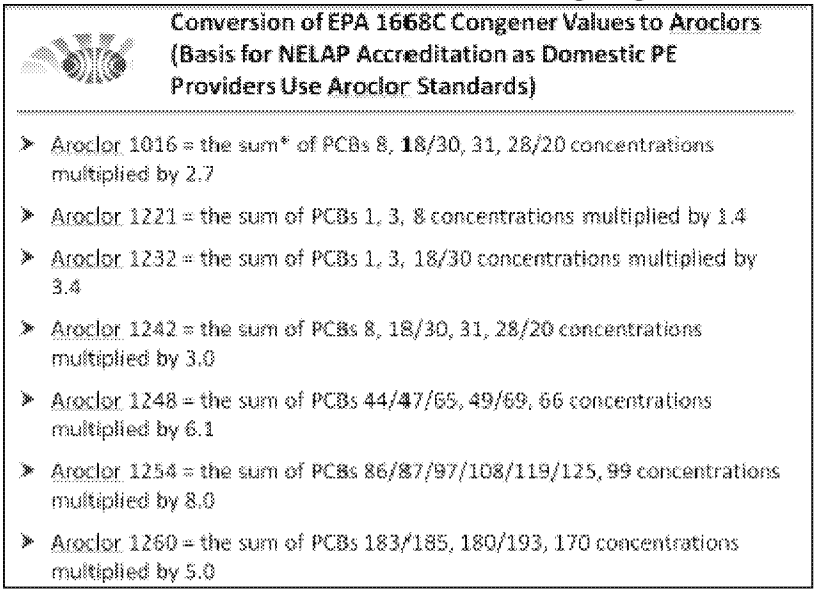
Page 13 (section 1.2.1) primary goals. The wording of the two goals at the top of this page suggests that passive sampling results will apply to the second objective (eliminating source areas) but not the first objective (identifying potential source areas). The passive sampling results will be used to achieve both objectives.

Page 13, DQO-1: Identify Ongoing Sources of PCBs in the River:

1. **Analysis for identifying source areas.** In addition to total PCB concentrations, another important line of evidence is variability in congener concentrations. Different concentrations of congeners and the percentage of total PCBs represented by those congeners can indicate different source areas.

2. **Estimates of 1254.** NELAP has developed an arithmetic relationship between the sum of concentrations of certain congeners (based on Method 1668C analysis) and PCB Aroclors. At this site, Aroclor 1254 has been identified as one of the primary Aroclors present in the River OU. The sum of PCB congener concentrations **86/87/97/108/119/125, and 99 multiplied by 8** has been shown to be one estimate of Arolcor 1254 concentration (NELAP Accreditation using Aroclor standards, *Green-Duwamish River Watershed, PCB Congener Study*, 2016. See Table 1, below).

Table 1: Estimates of Aroclor concentrations using congener results



3. **Number of sample locations.** Section 1.2.1 and Table 4 refer to 163 sample locations. Section 2.1.3 refers to 170 locations. Appendix B lists 163 target sample locations. Table 9 shows 170 field samples. Please clarify.

4. **Estimates of total PCBs.** Summing the subset of congeners proposed here may not provide an accurate estimate of total PCBs. As indicated in the QAPP, the representativeness of these subsets will be checked by testing ten of the passive samplers for the full list of congeners. We note that the QAPP is unclear regarding the number of congeners to be included in this full list. Table 4 in the QAPP refers to analysis of the ten samplers for the full list of 209 congeners. However, the text (section 1.2.2, paragraph 2) states that "A full scan of 130 congeners will be analyzed for a subset of 10 stations across the sample area. The 130 congeners represents the full list of congeners for which individual quantification has been developed."

   We request that the ten samplers be analyzed for the full list of 209 congeners.

5. **Statistics for identifying source areas – outlier test.** Single passive sampling locations may show elevated concentrations of PCBs in discrete areas. It is also likely, however, that the data may indicate the presence of separate populations of contaminant distributions related to the presence of source areas. For data consisting of samples from different populations, EPA recommends in ProUCL technical guidance that the data be first separated by using population partitioning methods, and then calculating statistics separately for each population. To this point, the Grubb's outlier test is designed to detect a single outlier in a normally distributed dataset. The sediment concentrations around Bradford Island are variable spatially (non-normal), with several different areas exhibiting elevated

concentrations. Therefore, it stands to reason that the results of the passive samplers will also exhibit spatial variability, so that the potential exists for several single "outliers" or, more likely, elevated concentrations in several passive samplers within a given area. The use of this test may mask the effect and proper identification of multiple outliers.

EPA's ProUCL technical guidance also recommends using Q-Q plots to graphically evaluate data. A normal Q-Q plot in the original raw scale helps to identify outliers because observations well separated from the majority of the data may represent potential outliers. Also, jumps and breaks of significant magnitude suggest the presence of multiple populations. Although visual comparisons are not quantitative, they may be the best methods of identifying passive sampling locations with elevated concentrations.

6. **Statistics for identifying source areas – 10 x 90% UCL on the mean.** DEQ uses the 90% UCL as an exposure point concentrations for mobile receptors. For non-mobile receptors such as benthic organisms and benthic fish (e.g. lamprey), we do not use 90% UCL concentrations, but instead consider the data point by point. A hot spot analysis is a point-by-point evaluation at 10x the acceptable risk level for ecological risk and human health non-cancer effects, and 100x the acceptable risk level for carcinogens. Hot spot levels are applied on a point-by-point basis.

   Additionally, the use of 10x the calculated 90% UCL on the mean of all passive sampling results (approximately 170 samples proposed) in different locations around the island to identify "source areas" is not recommended for the reasons stated in comment 5 above. As variability increases and elevated areas become more pronounced, the 90% UCL increases. In significantly variable datasets, the calculated UCL can be greater than the maximum detected concentration. Adding a 10x factor to this conservative estimate of the mean is not an appropriately sensitive decision criterion for identifying potential source areas. Note that this comment also pertains to section 1.2.3 of the QAPP.

7. **Definition of source areas/hot spots.** The last paragraph on page 13 in the section on DQO 1 refers to three types of analysis, but only two are enumerated. Overall, the wording of the paragraph requires attention.

   This paragraph also links the term "source area" to DEQ's definition of a hotspot. We agree that the goal of the passive sampling is to indicate where a hot spot (e.g. presence of NAPL, high sediment concentrations, etc.) may occur. However, the analysis of dissolved water concentrations does not, on its own, ensure that hot spots are absent. We note the regulatory definition of hot spot:

340-122-0115 (32) "Hot spots of contamination" means:

(a) For groundwater or surface water, hazardous substances having a significant adverse effect on beneficial uses of water or waters to which the hazardous substances would be reasonably likely to migrate and for which treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time, as determined in the feasibility study; and

(b) For media other than groundwater or surface water, (e.g., contaminated soil, debris, sediments, and sludges; drummed wastes; "pools" of dense, non-aqueous phase liquids submerged beneath groundwater or in fractured bedrock; and non-aqueous phase liquids floating on groundwater), if hazardous substances present a risk to human health or the environment exceeding the acceptable risk level, the extent to which the hazardous substances:

(A) Are present in concentrations exceeding risk-based concentrations corresponding to:

(i) 100 times the acceptable risk level for human exposure to each individual carcinogen;

(ii) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or

(iii) 10 times the acceptable risk level for exposure of individual ecological receptors or populations of ecological receptors to each individual hazardous substance.

(B) Are reasonably likely to migrate to such an extent that the conditions specified in subsection (a) or paragraphs (b)(A) or (b)(C) would be created; or

(C) Are not reliably containable, as determined in the feasibility study.

Source areas with total PCBs that are highly concentrated, highly mobile, or not reliably containable cannot be identified simply through the monitoring of dissolved water concentrations. The goal is to use this indicator to focus on sources areas that may contain significant sediment concentrations, the presence of NAPL, or facilitated (colloidal) transport of PCBs in water. We therefore anticipate that follow-up sampling of these other phases and/or additional locations may be needed to determine if an area is a source area or contains hot spots, considering the definitions stated above.

Page 13, DQO-2: Identify locations that may not be ongoing sources of PCBs at Bradford Island. This is a secondary goal, and careful consideration of the comments above regarding DQO-1 (regarding appropriate statistical tests) is necessary to reduce false negatives to an appropriate level.

Page 14, DQO-3: Identify locations that may represent an area of groundwater upwelling at Bradford Island. This was not discussed as an objective for this sampling,

and the data were not reviewed by the Technical Advisory Group to determine if this objective is met by the work plan and QAPP. Again, the primary goal should be the analysis of congeners determined to be drivers of fish tissue concentrations in order to meet DQO-1. Preference of analysis for congeners driving fish concentrations, as well as any additional information needed to estimate total PCBs, should be the priority. This comment also pertains to section 1.2.4 on page 20.

Table 5, Sample Locations, Media, Methods, Analytes of Interest, and Detection and Reporting Limits. Analytical methods should match those used for PCB congener analysis conducted for other media at the site (sediment, water, clams, fish). Methods 1668A and 1668C have been used in the past. Table 5 indicates that Method 1668C will be used. However, footnote b indicates that Method 8082 may be used. Method 1668C achieves lower detection limits, is the most reproducible, is least affected by matrix interference, and has the highest overall data quality and regulatory acceptance.

All values between the MDL and the PQL should be reported as detections. The table indicates the congener results will only be presented to the method reporting limits (MRL) determined by the LOQ. It is important that the analysis of the passive sampler LDPE be conducted using the same methodology and method detection limits that have been used previously for other media.

Section 1.2.2, full congener list. This section states that "A full scan of 130 congeners will be analyzed for a subset of 10 stations across the sample area. The 130 congeners represents the full list of congeners for which individual quantification has been developed." It is not clear why the full list of 209 congeners cannot be included for these ten stations. This comprehensive analysis provides some confirmation that the subset of total PCBs considered at other stations is appropriately representative of total PCBs.

Table 6, Subset of PCB congeners for analysis. The rightmost column of this table states that some of the proposed 46 congeners are "to be added (TBA)" or "semi-quantitative (SQ)". Does this mean that these congeners will be analyzed less rigorously?

We also note that this table lists 46 congeners, but Table 4 and section 1.2.2 refer to analysis for only 45 congeners. Please clarify.

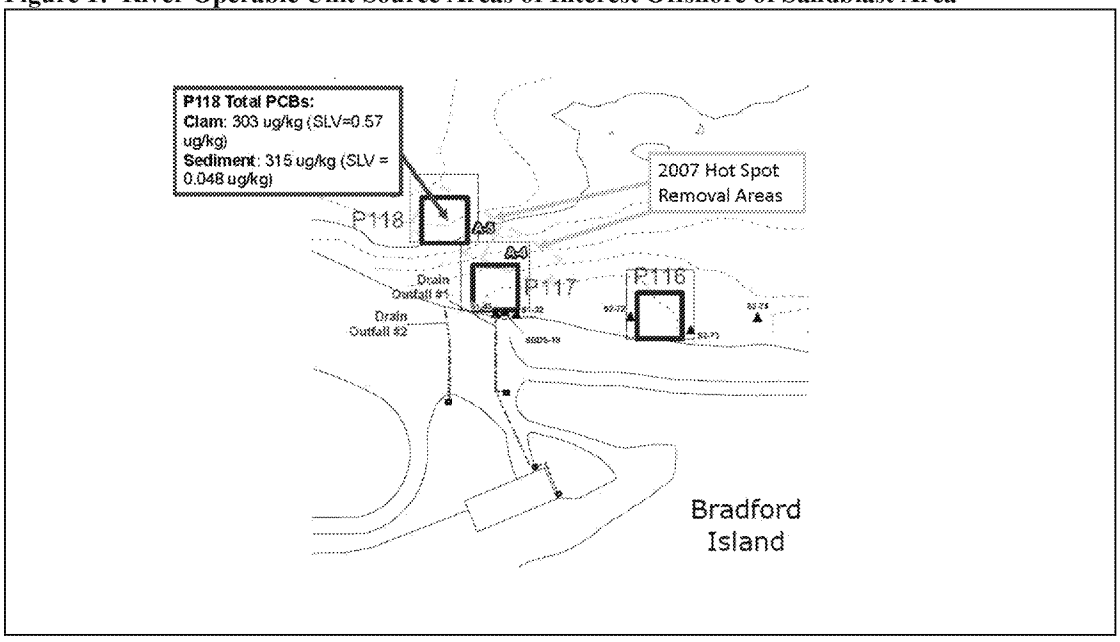
Section 2.1.1, LDPE Sampling Apparatus. A specific list of the proposed PRCs should be added to the QAPP. Please also specify the density of the LDPE to be used for the samplers.

Section 2.1.3, Sample Station Selection [and Appendix C, Bradford Island Sampling Location Figures]. It would have been helpful if the sandblast area outfalls had been shown on the sample location maps provided in Appendix C. From what we can tell from the figures, the location of previous sediment sample P118 may be outside of the initial sample points, although it appears to be covered by contingency points north of Outfall #2. The omission of passive samples offshore of the outfall would be a significant data

gap in this passive sampling design, and would limit our ability to draw conclusions regarding the presence of source areas at Bradford Island.

Considering that a removal action occurred in this area in 2007, and subsequent traditional sediment and clam sampling was completed in 2012, it is not clear why the placement of passive samplers at those locations would not be feasible. This is an area of historical contamination, and sediment from a hot spot in this area was removed as a part of the 2007 remedial action. Based on concentrations detected in sediment and clams in 2012, this area is still an area of concern due to elevated concentrations of total PCBs. In sample location P118, sediment concentrations were 315 ppb, and concentrations in clams were 303 ppb (see Figure 1 below). This area would meet the criteria outlined in this section.

Figure 1: River Operable Unit Source Areas of Interest Offshore of Sandblast Area



Other sampling data. During sampler placement, please identify:

a. The direction of and velocity of water flow during the deployment period.
b. Indicate the actual depth of water where each passive sampler is placed
c. Record water temperature, and collect measurements of dissolved organic carbon.

Section 2.1.4, LPDE Sampler Field Processing, Table 9. The title of this table is "Methods, Sample Containers, Quantities, Volumes, Preservation, and Holding Times for Catch Basin Samples". Are catch basins proposed for analysis as a part of this effort? Also, the table appears incomplete.

Section 4.3.1, Data Package Deliverables. DEQ considers this a large data set requiring significant analysis. Therefore, the passive sampling analytical results should be provided in spreadsheet or database format in addition to pdf format. Reported data

should include (for each sampling location) the detected concentration of each PRC, passive sampler detected PCB congener concentrations (Cpe (ng/g)), the PRC corrected value (ng/g), fraction PRC loss, fraction equilibration for each congener, and all calculations and partition coefficients (log Kow, Dpe, K_{PEW} in L/kg, MWT) used to estimate the freely dissolved concentrations.